

*The impact of
deposit return systems
on beverage sales*

2.03	1.41
1.79	1.56
1.79	1.56
2.95	1.43
2.95	1.45
0.94	2.23
0.78	0.79
	0.64
	1.10
	1.10
	1.10
	1.45
	1.65

VAT SUMMARY

NET	VAT	TOTAL

The impact of deposit return systems on beverage sales

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Evidence-based insights from a global study

For decades, the beverage industry has resisted the adoption or expansion of deposit return systems (DRS) for beverage containers, citing concerns about the potential negative impacts on beverage sales in both the short and long term.

One of their primary arguments is that deposit systems increase costs throughout the distribution chain, leading to higher retail prices and subsequent declines in sales. These assertions overlook the complex interplay of factors that influence beverage prices and sales. Furthermore, these arguments are often based on studies that rely heavily on predictive modelling and that are based upon false or misleading assumptions. They also fail to recognise that in well-designed, modern deposit systems, operational costs are at least partially offset by the revenue generated through the sale of empty beverage containers as scrap and the unclaimed deposits.

To assess the validity of opponents' claims that DRS leads to a decline in beverage sales, Reloop and the Container Recycling Institute (CRI) compiled and analysed per capita packaged¹ beverage sales in existing DRS markets before and after the system was introduced or expanded, or the deposit amount was increased, using real-world case studies based on actual, sourced data points.² Our analysis indicates that there is no definitive evidence that the introduction of new or changes to existing DRS in and of themselves impacts sales, suggesting that opponents' concerns are unfounded.

Key findings

- It is important to carefully examine any decrease or increase in sales of beverages before reflexively attributing such change to the implementation (or expansion) of a DRS, as the factors that contribute to changes in beverage sales are complex and multifaceted.

Factors such as seasonal temperatures, economic conditions, and supply chain disruptions, may independently or collectively affect the price of beverages and/or beverage sales, and a thorough examination of all variables and their effects is necessary to draw accurate conclusions.

- None of the case studies presented in the report provides definitive evidence to suggest that the implementation (or expansion) of a DRS or an increase in deposit levels caused observed sales declines.

The fluctuations in sales observed across the case studies were well within the scope of normal variation and appear to align with regional trends.

- Studies asserting a causal relationship between DRS implementation and a drop in beverage sales should be scrutinised carefully, as they often rely on predictive modelling rather than actual historic data.

What sets our report apart is that we have compiled and analysed empirical data from established DRS markets to assess what actually occurred.

Introduction

As an increasing number of countries globally contemplate implementing deposit return systems (DRS) for beverage containers, the beverage industry has expressed concern regarding the potential adverse effects of DRS implementation on beverage sales.

These concerns encompass both the immediate aftermath of implementation and the long-term impact. One of their main claims is that businesses across the distribution chain will face higher costs as a result of DRS, leading to higher retail prices for consumers. According to their viewpoint, these increased prices will subsequently lead to a decline in sales:

“Although consumers get their deposit back when they return the bottles or cans to a retailer, the bottle bill imposes additional costs of time and money on retailers and wholesalers. Beverage retailers have to devote additional space and labour to storing the empty containers. That space, and that labour time, could be used for something else and hence is a cost to retailers. Beverage distributors have to carry the empty containers back to their warehouse, which means it takes extra time for each delivery truck to make a day’s delivery. This means extra costs to the beverage distributors.

Finally, beverage distributors reimburse retailers [a handling fee] per container in addition to the deposit. These higher costs must be absorbed by someone, either business owners in the form of lower profits, employees in the form of lower wages, or consumers in the form of higher prices. These serve to make [beverages] more expensive to purchase”³

While such arguments may initially seem persuasive, they overlook several important factors. For instance, in modern deposit systems that are designed according to best practice principles, the costs associated with operating the system are at least partially offset by the revenue generated from the sale of empty beverage containers as scrap, along with unclaimed deposits. These revenue streams significantly mitigate any cost increases attributable to the DRS. Opponents' arguments also fail to consider the significant cost savings resulting from DRS implementation, such as reduced extended producer responsibility costs for producers (relevant in Europe and Canada) and lower costs for municipalities and taxpayers (as a result of reduced municipal recycling, disposal, and litter clean-up costs). Lastly, these arguments imply that no other factors simultaneously affect the price of beverages or beverage sales. It is well-established that a multitude of factors, including seasonal temperatures, economic conditions, and sales tax advantages in neighbouring jurisdictions, can independently or collectively impact beverage sales. Moreover, it is crucial to recognise the inherent volatility in sales that can occur due to changing consumer preferences and market trends.

In this new report, Reloop and CRI offer evidence to debunk the myth that deposit systems negatively impact beverage sales.

Using case studies from around the world (Europe, Canada, the US, and Australia), we present data from before and after DRS implementation—or before and after scope expansions or changes to the deposit level—to demonstrate that there is no attributable drop in sales from existing or reformed DRS. We also compare this to sales trends in bordering states/countries that have not introduced DRS and explain why correlation does not equal causation. Lastly, we discuss and shed light on some of the inaccurate and misleading assumptions made by opponents to support their studies' claims that DRS adversely impacts sales. It's worth noting that most of the studies making these claims rely on predictive modelling and hypothetical scenarios, which essentially amounts to an individual's best estimations of future outcomes based on certain assumptions.

Our report stands out due its unique approach of compiling and analysing real data from existing DRS markets, providing a comprehensive and evidence-based assessment of the actual outcomes.

Comprehensive and
evidence-based
assessment of the
actual outcomes

A look at claims regarding the impact of deposit return systems on sales

Consumers
experience no
net spending
loss or gain

As highlighted in a recent report⁴, a key argument put forth by opponents of DRS is that the deposit consumers pay is akin to a consumption tax. They claim that a deposit value of €0.10 to €0.25 is noticeable for consumers and will lead them to reduce their consumption, thereby causing a decrease in sales. However, this claim is misleading and overlooks a crucial factor: unlike taxes, deposits are temporary and fully refundable upon the return of the beverage container. Therefore, assuming convenient and accessible redemption, consumers experience no net spending loss or gain. A helpful analogy can be drawn from beer kegs, where consumers pay a deposit that is later refunded upon returning the empty keg. In Ontario, Canada, for instance, keg deposits range from CAD\$20 to \$50 (approximately USD\$15-\$37, €10-34) per keg.⁵ Rather than perceiving the deposit as an additional burden, consumers are more likely to view it as a small investment that they can easily recoup.

Many consumers may not even consider the deposit as part of the purchase price when making a decision to purchase beverages and may not notice the deposit until after the purchase, when it is itemised as a separate charge on the receipt. Unlike the prominently displayed product prices, which are often showcased in large and noticeable font on shelf tags, the deposit amount is often displayed in a way that is significantly less visible or, in some states and retail settings, not mentioned at all on the shelf prices. This omission may be due to the absence of legal requirements or non-compliance by retailers.

Furthermore, if we accept the premise that consumers view the deposit as a form of tax that deters their purchase, we must also recognise the potential for the refund to function as a reward or incentive, similar to a coupon, that could potentially increase sales. In fact, a recent survey carried out in the UK to gauge consumer attitudes on the upcoming DRS found that 60% of respondents said the ability to reclaim a deposit would make them **more likely** to purchase products included in the scheme.⁶

Opponents of DRS may counter that despite the full refundability of the deposit on beverage containers, it could still be perceived by consumers as a stealth charge or a price increase added to the retail price of beverages. However, if consumers were truly price sensitive to the extent that the deposit deterred them from purchasing beverages, they would logically opt for more cost-effective alternatives such as tap water (with that said, we recognise that in many communities, concerns surrounding tap water quality, including outdated public infrastructure like lead pipes, or other factors, can contribute to a genuine or perceived mistrust of tap water, thereby influencing bottled water consumption). Contrary to the logic, the data doesn't suggest any such response.

Those who oppose DRS also contend that the inconvenience associated with returning containers for reuse or recycling outweighs the value of the deposit for most consumers. According to their argument, this perception leads consumers to view the deposit as a price increase, ultimately resulting in a negative impact on beverage demand. While this argument holds true in cases where DRS lacks a user-friendly design, it fails in the presence of modern DRSs, which are built upon a convenient return-to-retail model, ensuring accessibility for all consumers, including those with lower incomes. Additionally, it is reasonable to assume that consumers who do not prioritise container returns likely exhibit a lower price elasticity of demand, rendering a slight perceived price increase negligible in their purchasing decisions.

In a similar way, opponents assert that adding a deposit on beverages could encourage certain retailers, particularly smaller ones, to buy drinks from neighbouring jurisdictions without DRS to avoid paying the deposit and generate additional revenue by pocketing the deposit as an extra profit. State agencies in the US have detected numerous instances of this practice while monitoring and enforcing container deposit laws. This emphasises the crucial need for DRS legislation to incorporate stringent penalties for producers and retailers who fail to comply with the law, along with robust governance mechanisms and measures to ensure accountability of the system.



DRS could still be perceived by consumers as a stealth charge or a price increase added to the retail price of beverages

Case study: Claims of negative impacts of DRS on beverage sales in Kentucky

In 1999, the Center for Business and Economic Research (CBER) at the University of Kentucky conducted a study to examine the impact of a DRS on existing sales and employment in food stores in Kentucky, as well as the impacts along Kentucky's borders where consumers have the option of crossing into other states to do their grocery shopping.⁷ The study, which was funded by the Kentucky Grocers Association, found that the introduction of a DRS in that state would result in significant losses in sales, employment, and worker earnings in Kentucky's grocery stores. The study attributed this outcome to the higher prices on beverage products resulting from the deposit, which would ultimately lead to a loss of sales. Specifically, the authors estimated that if a USD\$0.05 deposit were added to beverage containers in Kentucky, then soft drink sales would fall by 10.6% *"over the long run."*

One of the underlying assumptions CBER made was that if deposit legislation were introduced, Kentucky residents would do their major shopping for household products and groceries in adjacent states, leading to an overall reduction in purchases of many types of goods at Kentucky stores. It was estimated that the impact of cross-border shopping under a DRS would be an additional loss of \$118.1 million in sales and 826 FTE (full-time equivalent) jobs for the grocery industry in the first year alone.⁸

It is worth noting that the study's primary premise is based on an assumption that a significant amount of Kentucky shoppers will dramatically change their regular shopping habits and drive across the border to another state to shop for groceries. Note that this would only be feasible for a small percentage of Kentucky residents that live close enough to the border to shop in another state, and that those residents would be incurring extra costs and time associated with driving to an out-of-state grocery store. A further test to this cross-border shopping theory is that the areas of major population density in Kentucky are located in the Louisville and Cincinnati areas, where Kentucky is separated from other states by a river that must be crossed via a bridge to travel to another state.

It's also worth noting that this study used predictive modelling to quantify the effects that were expected to occur; it did not use real-world historical data on changes in beverage sales over time. An evaluation of this study by the Legislative Research Commission (LRC) staff economist's office concluded that *"the scope of the CBER report is not sufficient to provide a complete assessment of the 'economic impact...in Kentucky' of the reviewed legislation."*⁹ The LRC staff economist evaluation stated that factors that would likely offset the estimated negative economic effects were not considered, and also questioned specific estimation methods used by the authors to quantify consumer costs and consumer responses to those costs, including the method used by CBER to estimate sales reductions in border counties.

Correlation does not equal causation

There is a well-known principle in statistics that **correlation does not imply causation**. But what does this mean? In essence, it refers to the inability to legitimately deduce a cause-and-effect relationship between two variables solely on the basis of an observed correlation between them.¹⁰ Unfortunately, many people, including business leaders, policymakers, and media outlets, mistakenly make claims of causation based on correlations all the time, which are often unscrutinised and used to guide decision-making.

In the context of DRS and its potential impact on sales, it's important to remember that as with anything else, beverage sales are influenced by a number of factors. For instance, changing of labelling is a significant undertaking and can affect sales. In the months leading up to a DRS launch, distributors and retailers may sell their items at discounted prices to quickly sell off inventory with the old labels. Consequently, sales of beverage products with the new labels may initially appear slower after DRS implementation as consumers will have stocked up beforehand. This may give the impression of a sales decline, but it actually reflects a shift in sales from one period to another.

Major world events like the COVID-19 pandemic can also impact sales. A recent report¹¹ found that there was a significant increase in retail sales of packaged beverage alcohol during the beginning of the pandemic, with sales reaching a plateau in the third quarter of 2020. According to the report, from March 2020 to September 2020, there were \$41.9 billion in beer, wine, and liquor store sales, representing a 20% increase compared to the same period in 2019. A variety of factors may have influenced the increase in sales, including changes in consumer behaviour and increased alcohol consumption due to pandemic-related stress and anxiety.

Business leaders,
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based on correlations

There was also a shift in alcohol sales as bars and restaurants closed, resulting in a near cessation of **draft** beer sales. Concurrently, there was an increase in **packaged** beer sales as people purchased more beer for home consumption.

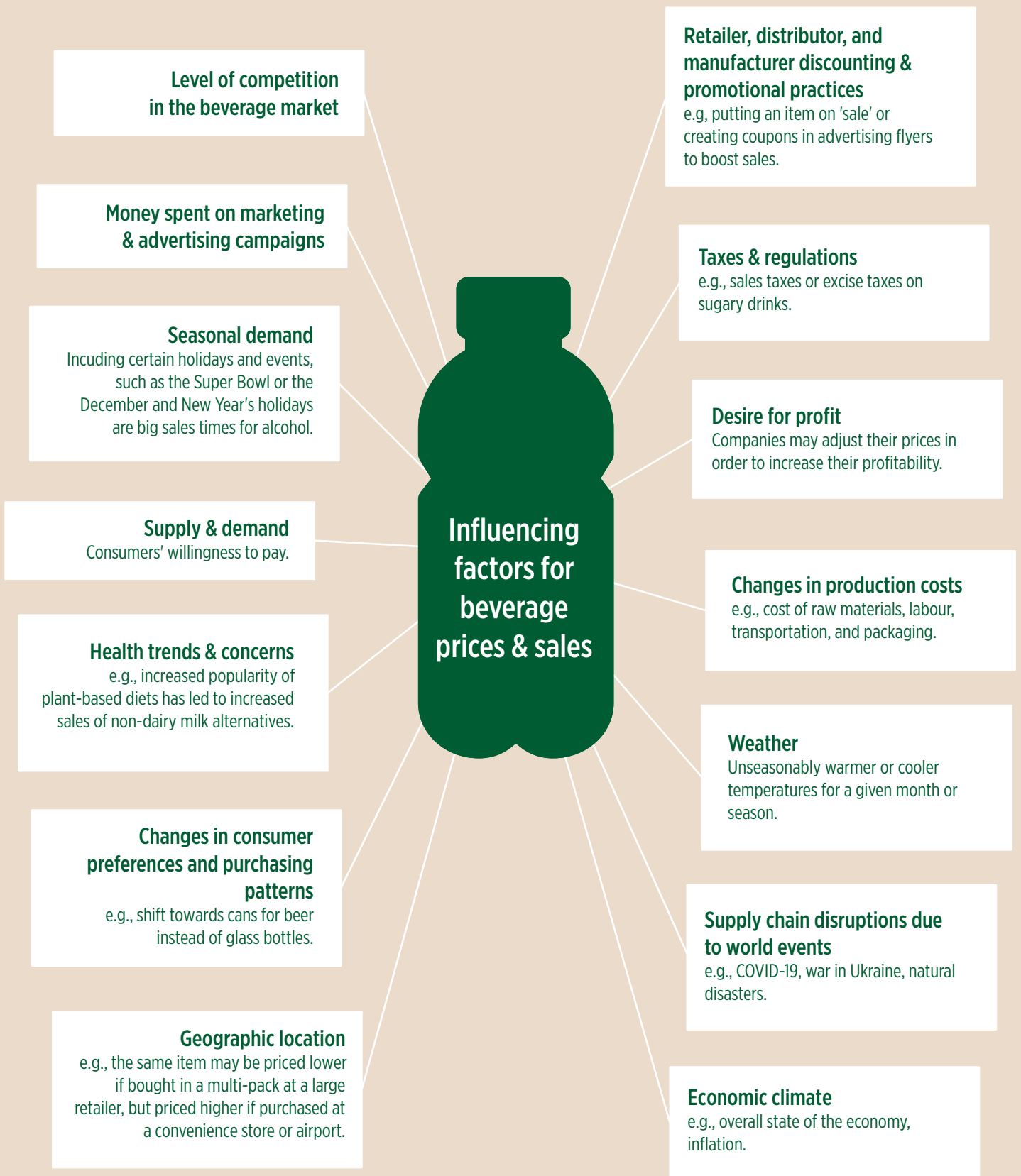
There is also the fact that price increases in the beverage industry are not always the result of a DRS, and that retailers and beverage producers regularly adjust their prices for various reasons. A recent study¹² by the Economic Regulation Authority, which examined the effects of the DRS on beverage prices in Western Australia, highlights this point:

“Beverage retailers are free to price products as and when they choose, within the constraints provided by competitive pressures, and competition and retail laws. The market is composed of many participants – manufacturers, importers, wholesalers and retailers – whose behaviour may affect retail prices. Pricing decisions are opaque. Retailers may practice “lumpy pricing”, that is, they may change prices in particular increments rather than by the exact amount of a cost increase. Furthermore, price changes may be affected by non-promotional and promotional price cycles, which affect rates of cost recovery. The many factors that affect beverage prices make it difficult to determine which price changes are due to the scheme.”

As an example of how price fluctuations in the beverage industry can occur for various reasons, in October 2022, PepsiCo announced it was raising the prices of its snacks and beverages to counteract expected high double-digit increases in commodity costs for the year (notably, PepsiCo had already increased prices by an average of 12%, 10%, and 7% in Q2 2022, Q1 2022, and Q4 2021, respectively).¹³ Similarly, Coca-Cola Co. announced in February 2023 that it would increase its soda prices to “combat stubbornly high costs.”¹⁴ It was reported that Coca-Cola’s decision to raise drink prices due to inflation did not negatively impact demand for its products, with net sales rising 5% to \$10.98 billion in Q1 2023.¹⁵ Notably, Coke’s coffee business saw a 9% increase in volume, while its water division’s volume rose by 5%. However, demand for tea was affected by the earthquake in Turkey, leading to a 3% decrease in volume during the quarter. The article also mentions that the suspension of Coke’s Russian business offset sales increases in other markets, such as strong sales for its Fairlife dairy brand in the US. This serves to reinforce the point that beverage prices and sales are impacted by a multitude of factors, and in fact the price elasticity of demand relating to beverages is not as elastic as suggested by beverage producers.

The complexity of factors that can influence beverage sales and prices is represented in Figure 1.

Figure 1: Factors influencing beverage sales and prices



Empirical analysis: Discrediting claims of deposit return systems' influence on beverage sales

One way to assess whether container deposits have a negative impact on beverage sales is to look at sales data in existing DRS markets before and after the system was introduced or expanded (e.g., increase to deposit level, new containers or beverages being added to the law). Such real-world case studies, based on actual, sourced data points, can offer authentic and valuable insight into beverage sales trends and the impact of different factors on consumer behaviour.

In this section, we present a series of case studies that provide compelling evidence supporting our claim that DRS does not adversely affect sales. Throughout these case studies, we present graphs illustrating a general upward trend in per capita packaged beverage sales overall.

These graphs also highlight slight year-to-year fluctuations in sales volumes, which show us what the normal range of variation is. It's important to note that several graphs exhibit a noticeable decline in sales around the years 2008 and 2009, which is likely attributable to the global recession and economic crash that occurred during that period.

Additionally, although the graphs do not provide specific data on sales by beverage type, it's important to recognise that shifts in consumer demand have also occurred. For instance, soda has experienced a decline in popularity, while bottled water has witnessed an upward trend in demand.

Compelling evidence supports our claim that a DRS does not adversely affect sales

Our methodology

The primary source of sales data for the case studies was GlobalData PLC, with the exception of Alberta, California, and Oregon. For the Alberta and California case studies, the data was obtained from system operators (Alberta Beverage Container Recycling Corporation and CalRecycle, respectively), while for the Oregon case study, the data was obtained from the Beer Institute. This was necessary as GlobalData PLC only provides sales data at the national level and not at the province or state level. For all case studies that used GlobalData PLC data, the dataset runs from 2000 to 2021, providing a comprehensive look at the sales trends over the past two decades. Furthermore, unless otherwise indicated, 'non-alcohol' refers to carbonates, waters, sports/energy drinks, ready-to-drink iced tea and coffee, and juice/nectars/still drinks.

Milk is **not** included in this study (Alberta case study is an exception). It's also worth noting that our dataset covers **packaged** beverage sales only, which excludes fountain drinks, draft beer/kegs, and products such as brewed coffee.

To avoid common errors in analysing sales trends, we focused on total volume¹⁶ of packaged beverage sales in each jurisdiction rather than unit sales (Alberta is the exception, where we report by units rather than volume, because there is no data available by container size). A common error made by other studies is comparing the number of units sold, which does not consider changes in container types and sizes that companies often make from year to year (e.g., shifting from glass bottles to aluminium cans, or increasing the size of aluminium cans).

To provide a more accurate comparison of beverage sales across different jurisdictions, we also ensured to compare beverage sales on a per capita basis. This approach helped eliminate errors that could arise from variations in population growth rates between states or countries.



This approach helped eliminate errors that could arise from variations in population growth rates between states or countries

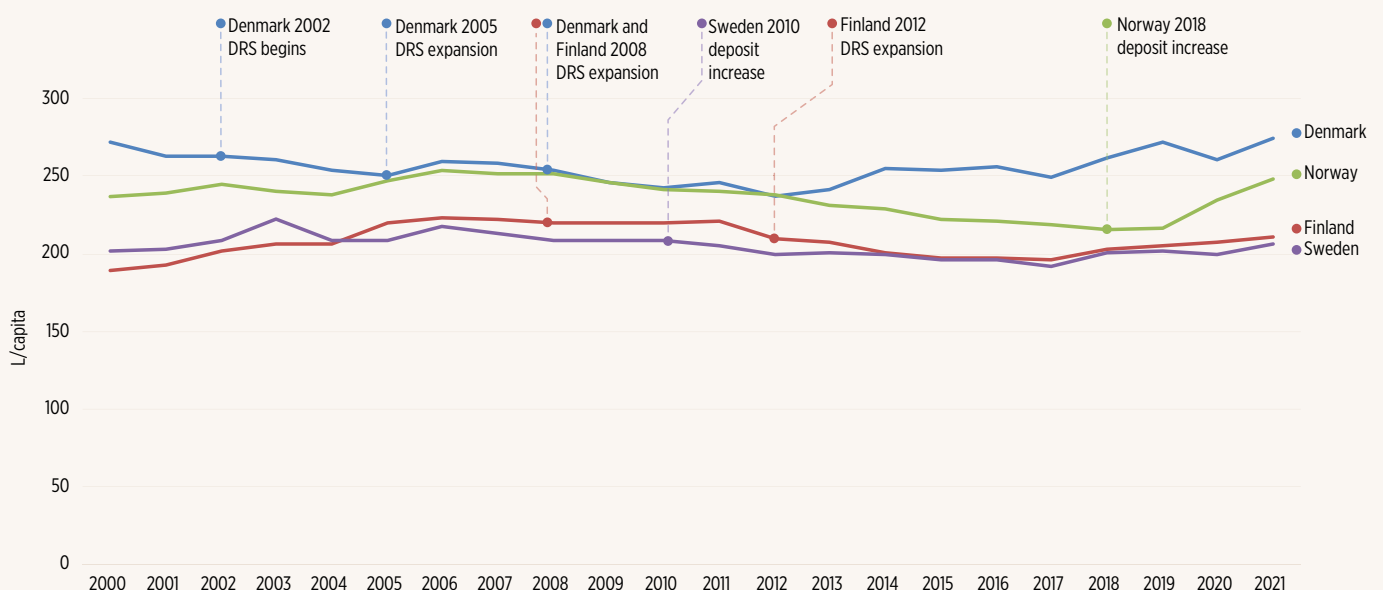
Case study: Scandinavia

Sweden

In 2010, the system operator of Sweden’s DRS for single-use containers doubled the deposit level for aluminium cans with an aim to improve recycling rates. This marked the first increase in 23 years and only the second adjustment since the launch of the DRS in 1984.¹⁷

Analysis of data from GlobalData PLC reveals a slight decline in per capita sales immediately after the deposit increase, however, this trend was not unique to Sweden, as neighbouring country Norway, which had not made any changes to its DRS during this period, experienced a similar sales decline. It’s also important to highlight that the decline in sales observed in Sweden from 2010 to 2012 falls within the normal range of variability, as demonstrated by other year-to-year fluctuations. For instance, there was an even more significant decrease in sales from 2003 to 2004, despite no deposit increase occurring during that period. This suggests that factors other than the deposit are at play.

Figure 2: Non-alcohol drink and packaged beer sales (all container types) in Denmark, Finland, Norway, and Sweden, 2000-2021 (L/capita)



Norway

Norway's deposit system for single-use cans and plastic PET bottles was implemented in 1999. By 2018, inflation had eroded deposit values and return rates had dropped, so the deposits were increased to help drive return rates back up. For containers with a capacity of 0.5L or less, the deposit increased from 1 NOK to 2 NOK (approximately €0.20), while those over 0.5L saw their deposit increase from 2.50 NOK to 3 NOK (approximately €0.30). There was an 8-month transition for the deposit increase to take effect (from January 1 to September 1, 2018).

Figure 2 shows that per capita sales¹⁸ in Norway remained relatively flat in the immediate period following the deposit increase, while two of its Scandinavian neighbours—Denmark and Finland—experienced a rise in sales during the same period. It's worth noting, however, that sales in Norway had been declining for several years prior to the deposit increase. Within a year or so of the deposit level change, sales in Norway began to pick up, and in fact, grew at a faster rate than its neighbours in the years 2019-2021.

Finland

Finland introduced its DRS for single-use containers in a staggered approach, starting with cans in 1996, followed by PET bottles in 2008, and eventually incorporating single-use glass in 2012.

Analysing data from GlobalData PLC on packaged beer and non-alcohol drinks, it is evident that the 2008 expansion to include PET bottles did not have a discernible impact on per capita sales. Sales remained relatively steady for the three years following the expansion until experiencing a decline in 2011, one year prior to the subsequent DRS expansion (see Figure 2).

Denmark

Denmark initially introduced its DRS in 2002 and subsequently expanded it to cover alcohol, non-alcohol beverages, cider, and energy drinks in March 2005. In April 2008, Denmark further expanded the system to include non-carbonated drinks such as mineral water, lemonade, and iced tea.

Based on data obtained from GlobalData PLC, per capita sales of non-alcohol drinks and packaged beer in Denmark followed a similar trend to other Scandinavian countries until around 2012, when Denmark's sales increased whilst declines continued in the other countries (see Figure 2). As shown in Figure 2, it is noteworthy that after the first expansion of the programme's scope in 2005, there was an increase in sales during the immediate year following the expansion (2005-2006). While sales experienced a decline from 2006 to 2010, it's important to acknowledge that this downward trend was not exclusive to Denmark but was also observed in neighbouring country Norway, which made no changes to its system during that time.



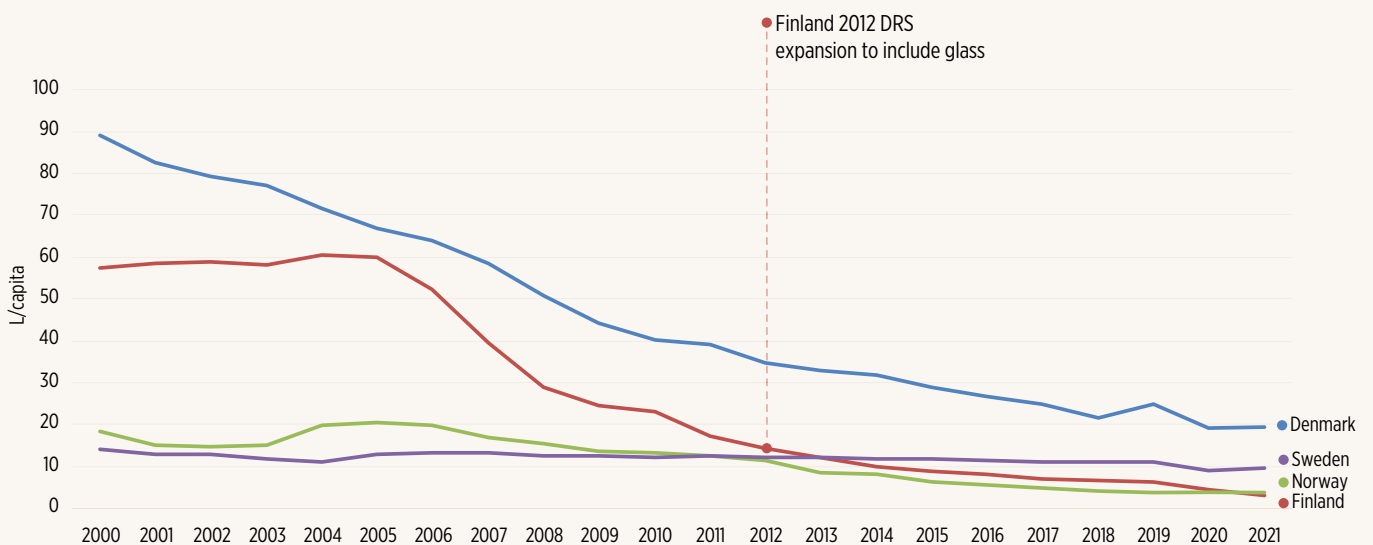
Case study: Scandinavia - Glass

Finland

As noted earlier, Finland’s DRS expanded to include single-use glass bottles in 2012, a few years after PET bottles were added.

Figure 3 illustrates a decline in sales¹⁹ of beer in single-use glass bottles several years prior to the introduction of a deposit on these containers, not only in Finland but also in neighbouring countries such as Denmark and Norway. Following the inclusion of single-use glass bottles in Finland’s DRS, per capita sales of beer in glass bottles continued to decrease at an almost identical rate to Denmark and Norway, the latter of which does not include single-use glass in its DRS.

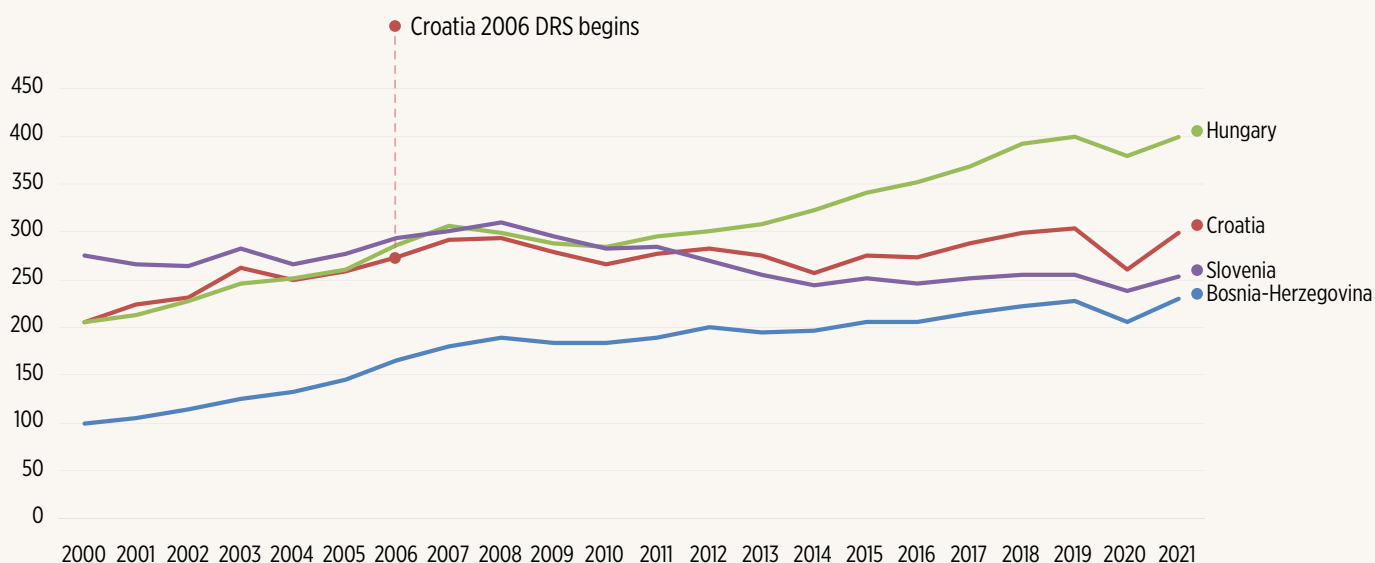
Figure 3: Non-alcohol drink and packaged beer sales in single-use and refillable glass bottles in Denmark, Finland, Norway, and Sweden, 2000-2021 (L/capita)



Case study: Croatia

Introduced in 2006, Croatia’s deposit system encompasses single-use plastic, metal, and glass beverage containers that are at least 200ml in size. The deposit value remains unchanged at 0.50 HRK (approximately USD\$0.07, €0.07) since the system’s inception. As shown in Figure 4, the introduction of DRS did not result in a decline in sales of non-alcohol drinks and packaged beer in the subsequent year. On the contrary, sales continued the upward trajectory observed before the DRS was implemented. While sales began to decline in Croatia around 2008, similar downward trends were evident in neighbouring countries Hungary, Bosnia-Herzegovina, and Slovenia. The presence of comparable sales patterns in these neighbouring countries, despite the absence of a DRS, suggests that other factors are contributing to these declines.

Figure 4: Non-alcohol drink and packaged beer sales (all container types) in Bosnia-Herzegovina, Croatia, Hungary, and Slovenia, 2000-2021 (L/capita)

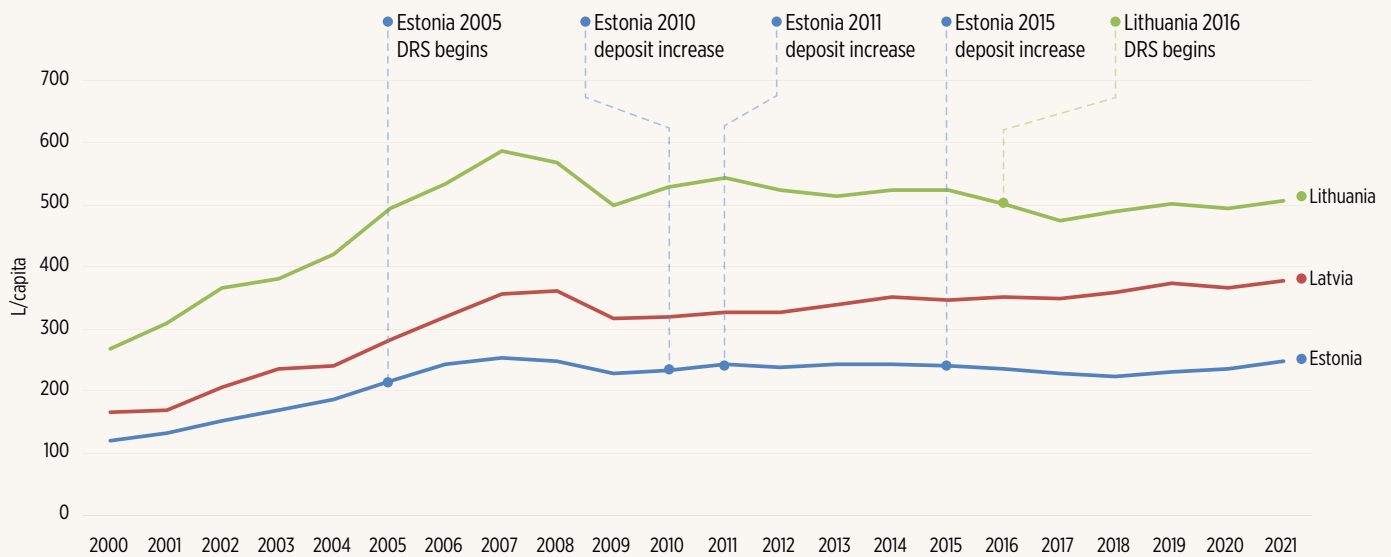


Case study: Baltics

Lithuania

Lithuania implemented its deposit system for single-use beverages in February 2016. Under the legislation, consumers pay a €0.10 (USD\$0.11) deposit when purchasing beverages packaged in single-use glass, plastic, and metal containers between 0.1 to 3L in size.²⁰ According to sales data obtained from GlobalData PLC, sales of packaged beer and non-alcohol drinks in Lithuania started to decline around 2015, one year prior to the DRS being introduced, but quickly rebounded after 2017 (sales increased in both of the two years following the decline), suggesting that factors other than the deposit were at play (see Figure 5). We can also see that from 2017 onwards, overall sales patterns were the same in both Estonia (which had a DRS in place since 2005) and Latvia²¹ (a country that did not have a DRS in place at the time). It’s also worth noting that the drop in sales experienced in Lithuania from 2015 to 2017 is well within the range of normal variability, as exhibited by other year-to-year changes in the past; one can see, for example, that there was a similar drop in sales from 2011 to 2013, years before the deposit was even introduced.

Figure 5: Non-alcohol drink and packaged beer sales (all container types) in Estonia, Latvia, and Lithuania, 2000-2021 (L/capita)



Estonia

Established in 2005, Estonia's DRS for single-use containers applies to a variety of beverages that are packaged in cans, plastic and glass bottles. These beverages include beer, soft drinks, water, juice and juice concentrates, nectars, cider, perry, and low-alcohol drinks.

Initially, the deposit on cans and small PET bottles was EEK 0.50 (€0.03), while the deposit for large PET and glass bottles was 1 EEK (€0.06). In June 2010, the deposit on cans was raised to 1 EEK (€0.06). When the Estonian kroon (EEK) was replaced with the Euro on January 15, 2011, the deposit on small PET bottles became €0.03, and €0.06 for all other container types and sizes. The deposit on small PET bottles was later increased to €0.04 in July of the same year, and to €0.08 for all other container types and sizes. In February 2015, the deposit values were unified to a single value of €0.10 for all materials, which remains the case today.

Based on data obtained from GlobalData PLC, the implementation of the DRS in Estonia in 2005 does not appear to have had any impact on sales of non-alcohol drinks and packaged beer. Figure 5 indicates that the rise in sales, which had started before the DRS was first introduced, continued until approximately 2007. Subsequent deposit increases in 2010, 2011, and 2015 showed that sales changes were all within the normal range of variation.

After a decline in sales from 2007 to 2009, there was a gradual recovery in 2009 to 2011, indicating that the deposit increase in 2010 had no discernible negative effect. While there was a slight decline in sales from 2011 to 2012—the year the deposit was increased for the second time—it is worth highlighting that during the same period, sales experienced a more significant drop in Lithuania, which did not have a DRS at the time. Similarly, in 2015 (when the last deposit increase happened), Estonia saw a decline in sales, but it aligns with a similar sales decline observed in Lithuania, where no DRS was in place.

Implementation of the DRS in Estonia does not appear to have had any impact on sales

Case study: Germany

The German government implemented a mandatory DRS for single-use drinks containers in early 2003, whereby a deposit of €0.25 (USD\$0.27) was applied to cans, PET bottles, and glass bottles with a capacity of 0.1L to 3L.

This deposit was considerably higher than the pre-existing deposit on refillable drinks containers, as the government sought to encourage consumers to switch to refillable packaging. It's also noteworthy to mention that Germany's starting deposit level of €0.25 was the highest initial deposit ever set when implementing a DRS system.

When Germany first introduced the DRS, there was no national system in place to collect the single-use containers, which meant that these containers had to be returned to the store where they were purchased ('island solution').²²

Under the law, retailers only had to take back containers of the same material, shape, size or brands that they sold, and to avoid having to establish a clearing arrangement, "island solutions" were established, where each retailer only accepted the special containers they stocked. Each island solution had its own on-pack symbol, and any containers without the label were refused.²³

While "open systems"²⁴, in which retailers took back each other's containers and refunded the deposit to consumers, accounted for about 20% of the market, "island solutions," operated mainly by discount grocery chains, predominated.²⁵ Germany's 'island solution' was finally replaced with a nationwide DRS in May 2006. Since this time, deposit-bearing containers can be purchased at one retailer and returned to another.

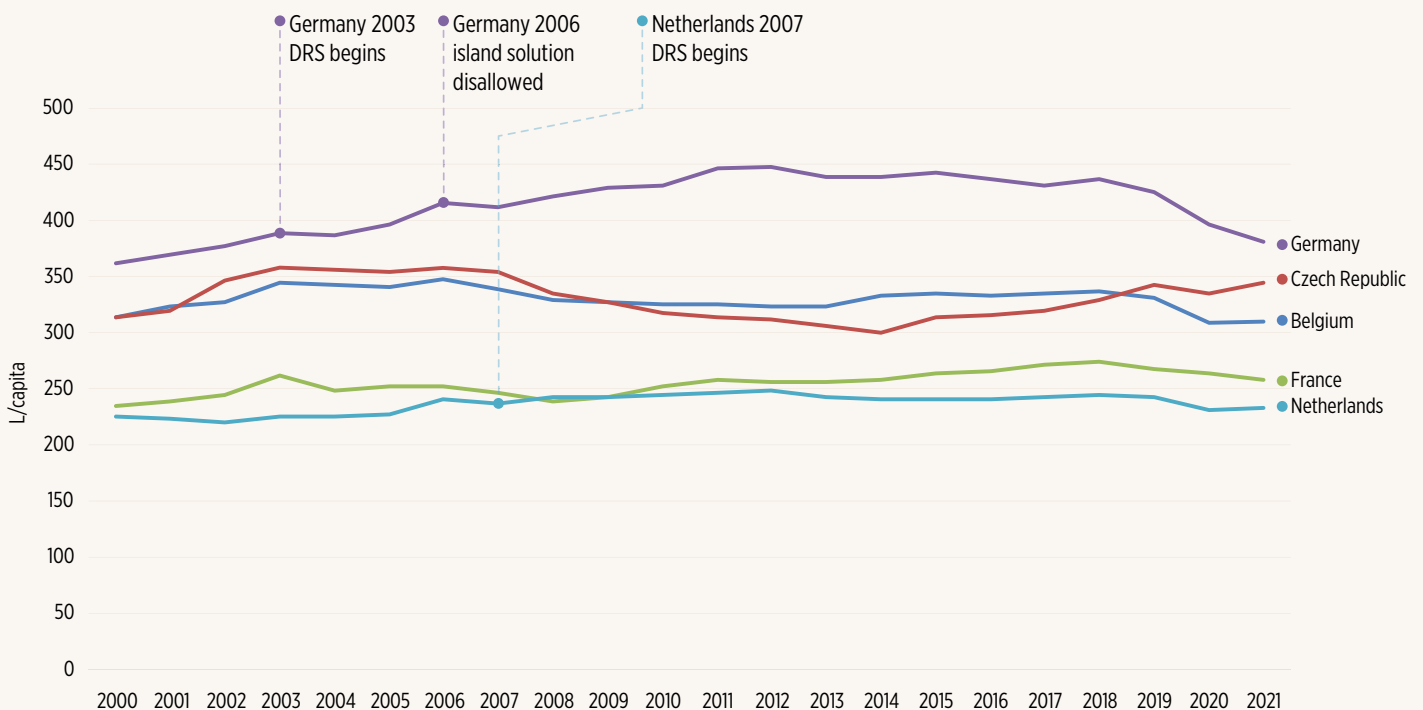
Germany's starting deposit level was the highest initial deposit ever set when implementing a DRS system

Figure 6 displays per capita sales of non-alcohol drinks and packaged beer in all container types from 2000 to 2021.²⁶ As illustrated, sales were steadily increasing from 2000 until 2006, when the island solution was no longer permitted and the nationwide DRS was implemented.

Following this change, per capita sales continued to climb in Germany, even as they declined in neighbouring countries such as Czech Republic and Belgium, which do not have a DRS.



Figure 6: Non-alcohol drink and packaged beer sales (all container types) in Belgium, Czech Republic, France, Germany and the Netherlands, 2000-2021 (L/capita)



Case study: Oregon

The US state of Oregon first implemented DRS in 1972, initially covering carbonated beverages such as beer, soda, and sparkling water. The system underwent expansion in 2009 to include still water, and in 2018, it was further expanded to encompass tea, coffee, sports drinks, fruit juice, hard cider, coconut water and most other beverages. Wine, spirits, and milk remain excluded from the programme.

In April 2017, Oregon raised the deposit on beverage containers from USD\$0.05 to USD\$0.10. We analysed beer sales and size data from the Beer Institute from 2012 to 2019²⁷ to determine whether a higher deposit led to changes in beer sales volumes. (In the US, alcohol sales volumes are available on a state-by-state basis, while these data are not available for non-alcohol beverages.) Annual beer sales data in Oregon were compared to that of four adjoining western states: California, Idaho, Nevada, and Washington. For context, California has a USD\$0.05 deposit on containers under 24 ounces, and a USD\$0.10 deposit for those of 24 ounces or larger. There are no beverage container deposit laws in the neighbouring states of Washington, Idaho, or Nevada.

To observe the impact of a change in deposit value, we focused on the period from 2012 to 2019 in Oregon, a state that experienced the change, and compared it to four neighbouring states that did not undergo such a change. Our aim was to isolate the variable that changed exclusively in Oregon and assess whether there was a notable effect in that state beyond the typical range of changes observed in both Oregon and the unaffected states.

Our analysis examines yearly changes as well as overall changes over the 7-year period. This duration allows us to capture longer-term trends since beer sales volumes display slight volatility with year-to-year fluctuations.

The increase in the deposit value in Oregon in 2017 did not cause beer sales to increase or decrease in any way that was outside of the normal year-to-year changes in beer sales in various states, both increases and decreases. The data from the five states show that beverage sales volumes naturally vary over time. In the years from 2012 to 2019, California's per capita beer sales volumes rose and fell each year, ranging from a nearly 5% decrease in 2016 to a 2.3% increase in 2014, yet there was no change in the deposit values in California over that time period. Idaho, Nevada and Washington all do not have a deposit system, and yet their per capita beer sales volumes declined as much as 7.4% in Washington in 2016, or rose by as much as 4% in Washington in both 2014 and 2019. Oregon's maximum decrease was 7.3% in 2016, and the maximum increase was 2.7% in 2019.

Impact of COVID on overall sales trend

We analysed the trend from 2019 to 2020 separately, due to its opposite direction. Combining both periods would have offset sales growth in one period with declines in subsequent periods, leading to an incorrect analysis for both time frames.

From 2012 to 2019, the long-term trend for beer sales showed a decline in four out of five states. However, the trend experienced a reversal due to the COVID pandemic.

The impact of COVID varied across the states, as illustrated by the chart. In most states, the implementation of stay-at-home orders resulted in a sharp decline in draft beer sales since bars and restaurants were closed for a portion of 2020. The decision to close and reopen bars and restaurants varied among the states based on individual government policies.

Conversely, sales of packaged beer increased as more people consumed beer at home rather than at bars and restaurants. From 2019 to 2020, Oregon witnessed a 4% rise in packaged beer sales, while California, Idaho and Washington saw increases of 4.8%, 6.1% and 6.6% respectively. Nevada, however, experienced a decline in beer sales during this period.

Notably, Nevada's packaged beer sales declined by 2.5%, surpassing the previous rate of decline. This steeper decline can be attributed to the state's heavy reliance on tourism, which was significantly impacted in 2020.

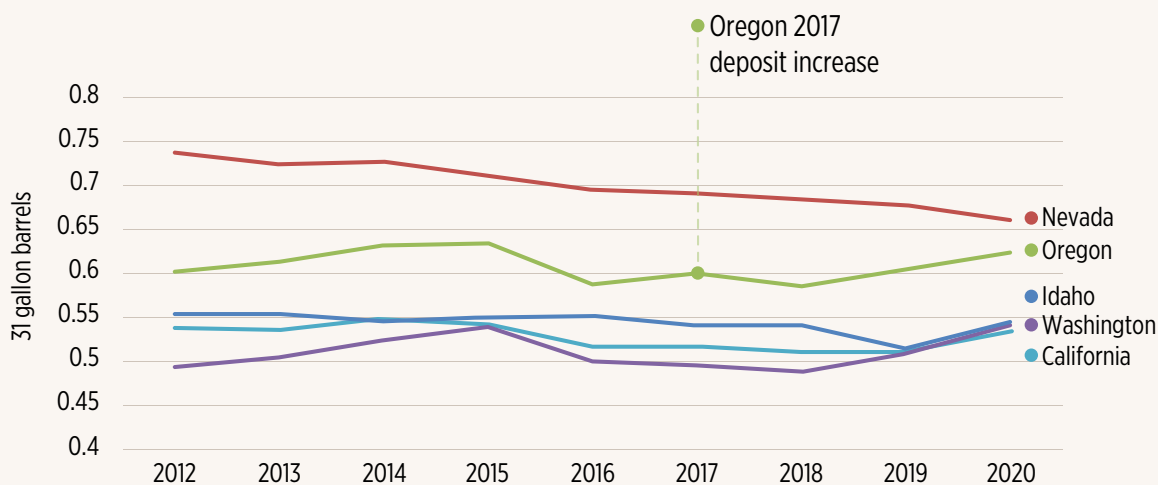


Deposit increase did not depress per capita sales volume

As Figure 7 shows, California (DRS state), Idaho (non-DRS state), and Nevada (non-DRS state) had net declines in per capita sales volumes of beer of 5.1%, 7.2%, and 8.1%, respectively, over the 7-year period from 2012 to 2019. Per capita volume sales rose by a net of 2.9% in Washington (non-DRS state) and declined by 0.3% in Oregon over that same period. It is also worth mentioning that the significant decline in per capita sales observed in Oregon from 2015 to 2016 occurred before the deposit increase.

Additional note: From 2015 to 2018 (the only years for which data on can size is available), the average beer can size in Oregon shrank 10.4% (from 17.3 to 15.5 ounces). While this decline was more pronounced in percentage terms than declines in neighbouring states and in the US as a whole, Oregon’s 2018 average can size was in the middle of the five western states: four of whose average can sizes were higher than the US average, as Figure 8 shows. We are including this information to illustrate how unit sales trends can be deceiving. Unit sales data may seem to indicate that more units are being sold, but if package sizes are decreasing, then the volume sold might also be decreasing (and vice versa).

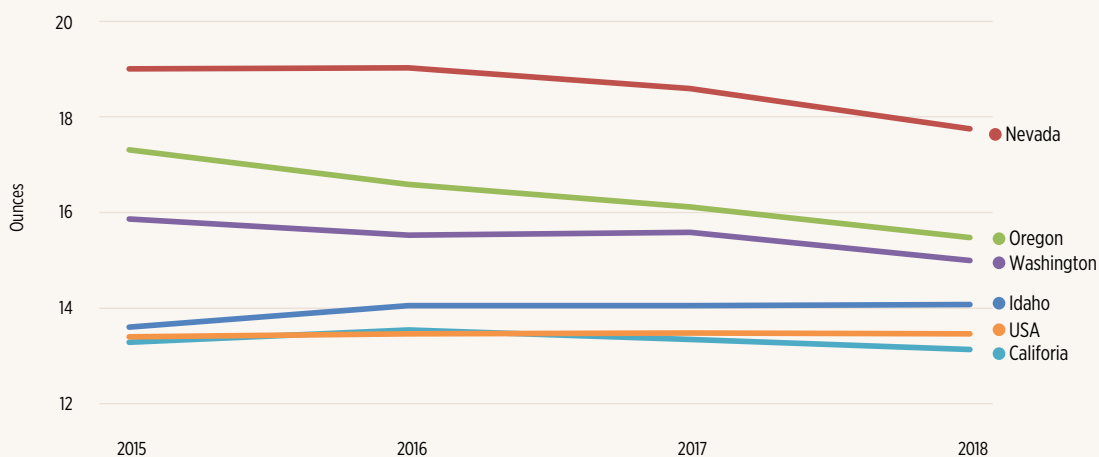
Figure 7: Per capita beer sales (all container types) in California, Idaho, Nevada, Oregon, and Washington, 2012-2020 (31-gallon barrels)



This case study serves to underscore how crucial it is to analyse all potential causes of an increase or decrease in sales, rather than solely attributing it to the introduction of a DRS. According to the theory that an increase in the deposit will cause a decrease in sales, Oregon’s per capita beer sales should have fallen in 2017, since the USD\$0.10 deposit was introduced in April 2017. Instead, Oregon’s per capita beer sales rose by 2.3% in 2017, as compared to 2016. In fact, Oregon’s sales increase in 2017 was the highest of the five states.

The following year, Oregon’s per capita beer sales declined by 2.7%, and then they increased by 2.7% the year afterward (2019). Of the 35 data points of sales changes, (five states multiplied by seven years), we found that 30 of the data points were increases or decreases within the range of plus or minus four percentage points. Only five data points were outside of that range. Therefore, the increases and decreases of two or three percentage points in Oregon are well within that range, and it would be impossible to attribute any increases or decreases to a specific event like a change in the deposit value. We also found that an increase in one year was often followed by a decrease in the following year, so that many of these year-to-year changes cancelled each other out, and the overall trend was much more stable.

Figure 8: Average beer can size in California, Idaho, Nevada, Oregon, Washington and the US, 2015-2018 (ounces)

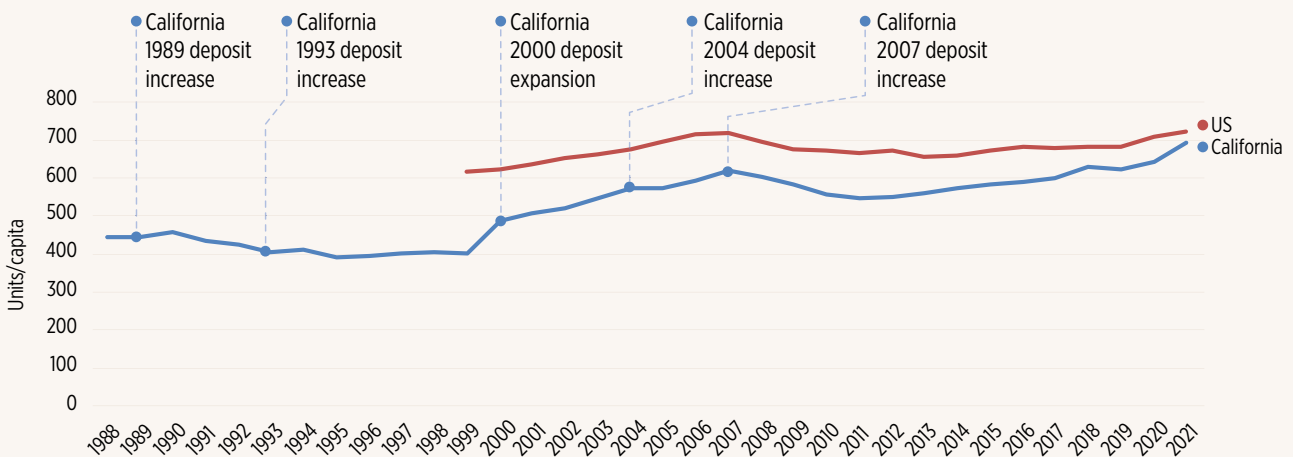


Case study: California

When California’s DRS was first passed in 1986, it applied a refund value of USD\$0.01 (California Redemption Value, or CRV) to glass and plastic bottles and aluminium cans for carbonated beverages only (beer, soda, sparkling water and wine coolers.). In 1989, California increased the CRV from USD\$0.01 to USD\$0.02; in 1993 from USD\$0.02 to USD\$0.025; and in 2004 from USD\$0.025 to USD\$0.04. In 2000, the state expanded the DRS to cover nearly all types of non-carbonated beverages (still water, sports drinks, tea, coffee, etc.). More recently, in January 2007 California increased the CRV from USD\$0.04 to USD\$0.05 (for small containers) and from USD\$0.08 to USD\$0.10 (for large containers).

Figure 9 shows sales of deposit-bearing beverage containers across this time period for all material types combined²⁸. The data presented in this figure are sourced from CalRecycle, which exclusively captures the sales of containers that are subject to the CRV, rather than encompassing all beverages sold within the state. State-level data for California’s neighbouring non-DRS states is not available, but national data for the US serves as a good comparison point. The figure illustrates that beverage sales increased steadily for the first few years after DRS implementation up until 1991, followed by several years of decline. Expansion of the programme’s scope in 2000 resulted in a significant increase in the number of covered beverages, which explains the rise in sales shown in the graph that year and beyond. The figure also shows that there were no significant disruptions in sales trends following any of the four CRV increases indicated on the graph, except for the last one (in 2007). The immediate sales decline that followed the CRV increase in 2007 can be attributed to the onset of the US recession that began in December of that year, affecting sales not only in California but across the country. As illustrated, sales in both the US and California declined during this period, taking a few years to recover.

Figure 9: Non-alcohol drink and packaged beer sales in all deposit-bearing containers in California (1988-2021) vs. equivalent container type and beverage categories in the US (1999-2021) (units/capita)



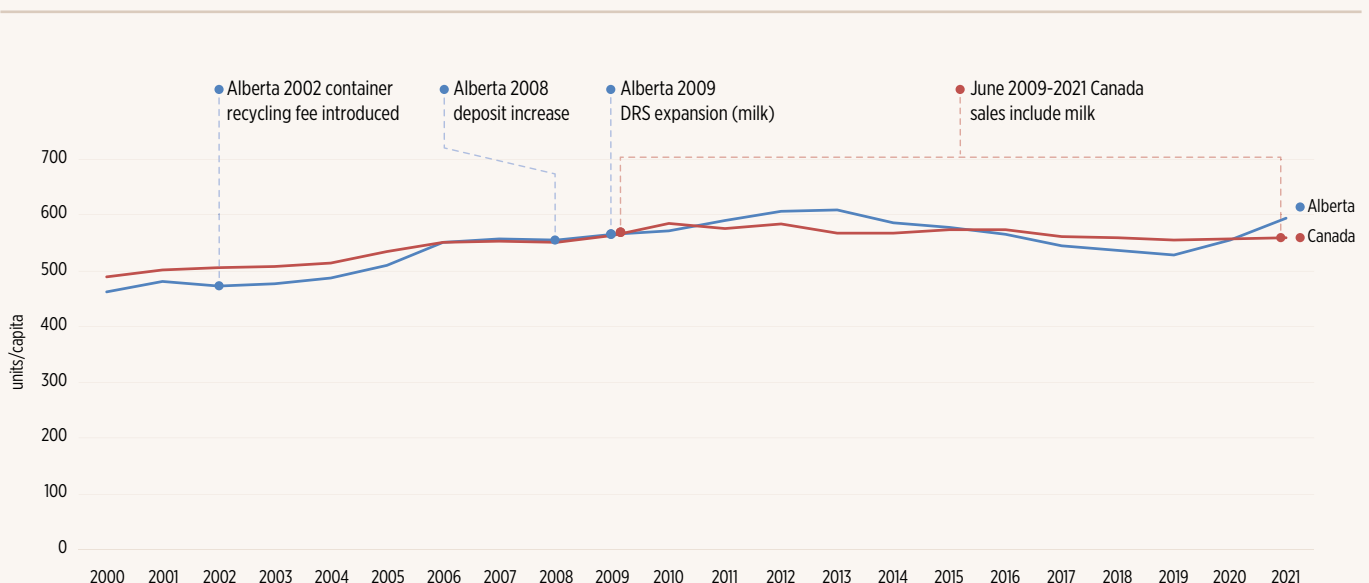
Case study: Alberta

Figure 10 displays the sales of non-alcohol drink and packaged beer in Alberta and Canada for primary container types from 2000 to 2021. Primary container types include all aluminium and bi-metal cans, rigid plastic bottles, glass bottles, and board/carton. The sales data for Canada is sourced from GlobalData PLC, and includes milk and milk drinks for every year since 2009, when these beverages were added to Alberta’s programme. On the other hand, the base data for Alberta comes from the Alberta Beverage Container Recycling Corporation (ABCRC), and estimates for sales of refillable beer bottles (2000 to 2020) and beer cans (2000 to 2007) for Alberta come from CM Consulting’s Who Pays What reports.²⁹

In September 2002, Alberta added a new non-refundable “container recycling fee” to the purchase price of all non-alcohol beverage containers, on top of the regular deposit amount. At the time of introduction, the fee ranged from 0-cents to 3-,5-,7-, and 8-cents depending on container size and material type. As shown in Figure 10, sales of alcohol, non-alcohol and beer deposit beverages increased slightly after the new fee was introduced.³⁰

The figure also shows that per capita beverage sales in Alberta continued to increase steadily from 2006 through 2013, despite an increase in the deposit levels in November 2008 and the introduction of a deposit on all milk and liquid cream beverage containers in June 2009. The deposit level for containers under 1L increased from CAD\$0.05 to CAD\$0.10, and from CAD\$0.20 to CAD\$0.25 for containers of 1L or more. Alberta set the deposit for all milk and liquid cream containers at CAD\$0.10 for containers under 1L and CAD\$0.25 for those over 1L.

Figure 10: Alcohol, non-alcohol drink* and packaged beer sales (primary container types) in Alberta and Canada, 2000-2021 (units/capita)



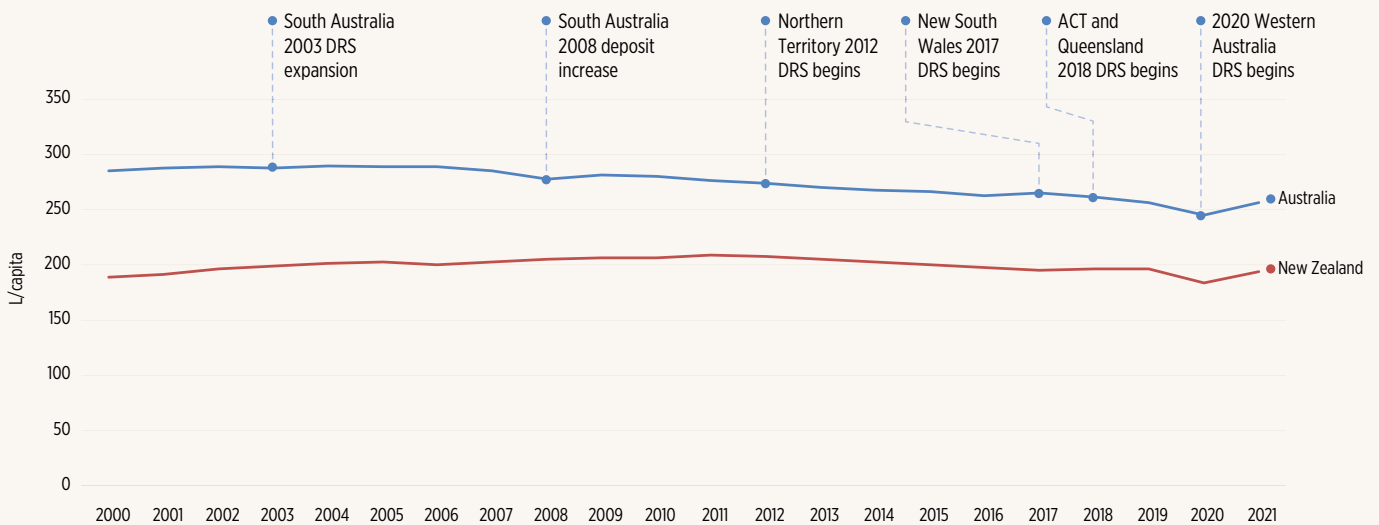
Case study: Australia

Australia’s experience with deposit schemes offers another interesting case study. South Australia was the first Australian state to implement a DRS in 1977, later expanding the scheme in 2003 to include more beverages, and in 2008, increasing the deposit. By 2020, five Australian states/territories had implemented DRS, including Northern Territory (2012), New South Wales (NSW) (2017), Australian Capital Territory (ACT) (2018), Queensland (2018), and Western Australia (2020). Together, these six states and territories represent 72% of Australia’s population.³¹ Once Victoria and Tasmania implement their respective DRSs, scheduled for 2023, the entire country will be covered by deposit schemes.

Figure 11 shows non-alcohol drink and packaged beer sales in Australia and New Zealand (a country without deposit return) from 2000 to 2021. The data, obtained from GlobalData PLC, demonstrates that despite the absence of a DRS in New Zealand, beverage sales in both countries have followed a similar trend across the years. While the chart shows a minor dip in sales around 2017-18, this is likely attributable to price rises which, while associated with the DRS, should not be attributed to it.

The NSW Office of Fair Trading had previously expressed concern about price increases being imposed on consumers and had received reports of ‘price rises that exceed the scheme costs’.³²

Figure 11: Non-alcohol drink and packaged beer sales (all container types) in Australia and New Zealand, 2000-2021 (L/capita)



In other cases, it was reported that manufacturers were raising prices for products not even included in the scheme.³³ Coca-Cola was also widely reported³⁴ to have increased retail prices by a significant 13.6-cents per unit. A Dow Jones article also reported at the time, “...*the public has so far paid AUD\$110 million in higher prices but only received about AUD\$8 million back, resulting in an ‘unexpected earnings boost’*” for the company.³⁵

It’s also interesting to note that despite not having a DRS, New Zealand’s consumption of non-alcohol drinks and packaged beer is lower than Australia’s on a per capita basis. Prior to the introduction of NSW’s deposit scheme, from 2011 to 2016, Australian sales were consistently about 24-25% higher than New Zealand’s. When NSW introduced its scheme in December 2017, and then ACT and Queensland the following year, the gap between the two countries narrowed a bit to around 23% in 2019. By 2020, however, the gap between Australian and New Zealand per capita sales had reverted back to 25%. Another interesting observation from the chart is that the small sales decline that occurred in Australia around 2017-18 was much smaller than the sales dip that occurred in both countries in 2020 as a result of the pandemic, showing once again that numerous factors can affect sales.

Examining claims of alleged negative impacts of DRS on sales in Australia

On 11 October 2012, the Australian Senate referred an inquiry on the operation of the South Australian and Northern Territory deposit schemes to the Senate Environment and Communications References Committee. The committee’s inquiry focused on a number of key issues, including the pricing and revenue allocation practices of the beverage industry in the systems operating in South Australia and Northern Territory.³⁶ In response to the Senate inquiry, Coca-Cola Amatil, Lion, and other beverage companies submitted statements arguing that a national deposit scheme would lead to a significant increase in drink prices. The Australian Food and Grocery Council (AFGC) backed the beverage producers, claiming that the implementation of a national deposit scheme “*would cost Australian families \$300 extra in their shopping baskets each year.*”³⁷ This claim, based on analysis by economists ACIL Tasman commissioned by the

Australian Beverages Council, was predicated on the assumption that all beverage prices would increase by AUD\$0.20 to AUD\$0.26, comprising a AUD\$0.10 deposit and a AUD\$0.10-\$0.16 handling fee.³⁸ However, the Federal Senate inquiry revealed that these assertions were wrong and misleading. On page 20 of the Senate report, it says that “*the AFGC’s claims of price rises due to container deposits...appear to be based upon...weak methodology and poor data.*”³⁹

Evidence submitted during the inquiry showed that retailers often provide discounts, thus consumers did not face a comprehensive price increase of AUD\$0.20 for all products, and the price of even one product such as a soft drink varies widely.⁴⁰ Furthermore, the alleged price hike included the AUD\$0.10, which consumers usually redeem;⁴¹ ignoring this fact serves to overstate the impacts of a DRS on households.⁴²

Converging evidence from other studies

In addition to carrying out our own analysis, we conducted a comprehensive review of existing research on the impact DRS on beverage sales. The findings from these studies align with our own and offer additional evidence to support our conclusions.

Here is a summary of their key findings:

Study: Sweden 2010

In Europe, one study found that the increase in deposit that took place in Sweden in September 2010 had no statistically significant effects on sales.⁴³

Study: Florida 2011

A study by the University of Florida's Economic Analysis Program⁴⁴ found that the impact of a DRS on beverage consumption is "essentially zero." The study asserts that the amount of the deposit is relatively low (compared to the price of the beverage), and that even if beverage prices were to increase by slightly more than the amount of the deposit, that still represents a small percentage increase in price.

Study: Australia 2021

An economic analysis of the DRS in Australian Capital Territory⁴⁵ carried out in 2021 found that consumer buying patterns are unlikely to be influenced by a rise in price, as the increase is deemed not to be big enough to alter individuals' behaviour. The same study also found that the impact on the food and beverage industry is \$0. While the study acknowledges that industry may incur costs associated with the transition and implementation of the scheme, it found that these costs could be offset to a large extent by the revenue generated from the recycled materials.

Study: California 2011

Another study conducted by the University of California, Berkeley found no evidence that sales of PET-packaged coffee and tea-based drinks, juice blends, and 100% fruit juice in containers <46 ounces declined after those beverages were added to the state's bottle bill in 2000.⁴⁶

Study: Massachusetts 2011

In 2011, the Massachusetts Department of Environmental Protection (MassDEP) carried out a survey to assess whether amendments to the state's DRS might increase consumer prices and retailer costs, and reduce consumer choice. This was in response to a claim by Real Recycling Massachusetts (a group established by the beverage and retail industries) that expanding that state's DRS would cost consumers nearly USD\$120 million annually in increased costs at grocery stores.⁴⁷ To conduct its analysis, MassDEP collected and compared information from Massachusetts and three surrounding states (New Hampshire [non-DRS state], Connecticut [DRS state], and Maine [DRS state]) on beverage pricing and product availability and conducted interviews with store managers and others in states with an updated DRS to see if the negative impacts predicted by opponents for Massachusetts had been experienced elsewhere. With regard to price increases, the study found no discernible difference in price between beverages in states with a DRS and those without, debunking the claim.⁴⁸ In fact, the study found that the beverages surveyed often cost more, not less, in states without a DRS than in states with a DRS. The study also found that supermarkets with regional operations have consistent pricing for both deposit and non-deposit beverages across states, regardless of whether the state has a DRS. In its report, MassDEP concluded the following⁴⁹:

“Opponents of an updated [DRS] have stated on several occasions that prices for beverages currently not covered under the Massachusetts [DRS] would ‘rise almost 5 cents’ in addition to the 5 cent deposit, if the [DRS] is updated.⁵⁰ If this prediction were accurate, one would expect prices for beverages covered under those states [DRSs] (Connecticut and Maine) to be consistently higher than in Massachusetts, where the updated [DRS] is not in effect on those beverages, or New Hampshire for that matter with no [DRS]. However, the preliminary data collected shows that water and other non-carbonated beverages were rarely more expensive in states that included them in their [DRS] versus Massachusetts or New Hampshire, which do not. Some of the beverages were actually more expensive in Massachusetts and New Hampshire than in Maine where they are included in the [DRS]. The survey data indicates that some types of bottled water sold in Connecticut were less expensive in Massachusetts, but in general beverages either cost the same or are more expensive in Connecticut than in Massachusetts regardless of whether the beverage is covered under the [DRS] or not.”

In addition to raising questions about the validity of claims that DRSs raise prices, the MassDEP study called into question the opponents' claim that an updated DRS would cost retailers nearly \$120 million/year. MassDEP explained that if the prediction were true, it would be expected that stores in Maine and Connecticut would have higher prices to compensate for the added expenses. However, the study indicates that Maine's prices were either the same or slightly lower than Massachusetts' prices, and Connecticut's prices were either the same or slightly higher than Massachusetts'.⁵¹

Study: Oregon 2005

A study by the Oregon Liquor Control Commission found that beer sales increased 5.12% in the year after the bottle bill's passage, from 1.4 million barrels sold between October 1971 and September 1972 to 1.5 million barrels sold between October 1972 and September 1973.⁵² Data also show that beer sales rates in Oregon (DRS state) and Washington (non-DRS state) remained nearly the same between 1970 and 1974. Beer sales increased at a rate of 19.7% in Oregon, while Washington's sales increased at a rate of 19.3%.⁵³

Study: Vermont 1977

A Task Force appointed by the governor of Maryland released a report examining the impacts of mandatory DRS legislation in other states⁵⁴. The report cites Vermont's case, which showed a 13% decline in beer sales (which are covered by the DRS) and a 15% decrease in hard liquor sales (not covered by DRS) by May 1974, nearly a year after the law's implementation. However, it notes that the decline cannot be attributed to the DRS itself:

"The reasons for these declining beverage sales are unclear, but are most certainly due to a number of factors... Vermont, which is heavily dependent upon recreational tourism, was plagued with...fuel shortages and poor snow conditions during the winter of 1973-74. The Vermont economy was off 11%, tourism was off 16% overall and 25% during the peak ski season. The record also shows that Vermont distributors had accumulated inventories of beer in [single-use] containers in anticipation of the law. When the law came into effect, they simply sold off their stock of [single-use] containers, thereby inflating the previous year's distributors' sales and deflating their subsequent year's sales."

The Task Force report concludes that while Vermont's experience suggests that there may be a slight drop in sales during the first year following DRS implementation, that following this period of adjustment the growth in sales can be expected to return to its historical rate and that there are no long-term effects expected on either the price or sales growth rate of beverages.⁵⁵

Conclusion

Unlike the majority of studies that have examined the impact of DRS on beverage sales, which often rely on predictive modelling, our report distinguishes itself by utilising empirical data compiled from established DRS markets. Based on our comprehensive analysis, the following key findings emerge:

- **None of the case studies provide definitive evidence** suggesting that the introduction or expansion of a DRS caused a decline in beverage sales. Fluctuations in sales observed across the case studies were within the normal variation range and aligned with regional trends.
- Besides the deposit, various **independent or cumulative factors can influence beverage sales**, including seasonal temperatures, economic conditions, sales tax rates, the existence or absence of DRS in neighbouring jurisdictions, retail hub locations, and pricing practices of beverage retailers and distributors. For this reason, any changes in sales (increases or decreases) should not be solely attributed to DRS, as multiple complex factors contribute to these fluctuations.
- **Claims asserting a causal relationship** between DRS implementation and reduced beverage sales should be scrutinised carefully, as they **often come from studies that are based on misleading and erroneous assumptions**.

These findings emphasise the need for a comprehensive understanding of the complex interplay of factors affecting beverage sales and the cautious interpretation of claims regarding the influence of DRS implementation. By leveraging empirical data, this report offers a more accurate assessment of the relationship between DRS and beverage sales, contributing to a more informed discourse on the topic.

Endnotes

- 1 This study exclusively focuses on packaged beverages, excluding sales of draft, keg, or fountain drinks, as well as brewed coffee and other related products. The rationale behind this approach is that only packaged beverages are subject to DRS, hence the study is tailored to specifically analyse the impact on this category.
- 2 The primary source of sales data for the case studies we present was GlobalData PLC, with the exception of Alberta, California, and Oregon. For the Alberta and California case studies, the data was obtained from system operators (Alberta Beverage Container Recycling Corporation and CalRecycle, respectively), while for the Oregon case study, the data was obtained from the Beer Institute. For all case studies that used GlobalData PLC data, the dataset runs from 2000 to 2021, providing a comprehensive look at the sales trends over the past two decades.
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- 16 Sales data are primarily reported in litres/liters (L) for all case studies, except for the Oregon case study where sales are reported in barrels (31-gallon barrels).
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- 19 Sales data obtained from GlobalData PLC.
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The nonprofit Container Recycling Institute (CRI) is a leading authority on the economic and environmental impacts of used beverage containers and other consumer product packaging.

Our original research, objective analysis, responsible advocacy and wide-ranging education serve as the foundation of our mission to make North America a global model for the collection and quality recycling of packaging materials.



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